



# Mount Rainier National Park

## Sister Mountain Project

### Do It Yourself: Rainier Field Investigation

<b>Overview</b>	In this inquiry-based activity students will create their own field investigation focusing on soil, water, plants, life, or weather. By studying the effects of natural resources upon one another and also how man influences and is influenced by natural resources students will learn how to better live within our means and see ways that resources affect each other.
<b>Grade Level</b>	5-12
<b>Objectives</b>	<ul style="list-style-type: none"><li>• Students will create, execute and present a field investigation of their choice.</li><li>• Students will understand how to use the scientific method as a means to conduct a field investigation.</li><li>• Students will learn how one person's field investigation results can be compared to another's.</li></ul>
<b>Setting</b>	Outdoors at local natural area or school yard
<b>Timeframe</b>	Preparation-30 minutes Travel time to study site-varies Activity-one or more 50 minute periods per/study site
<b>Materials</b>	Varies on field investigation <ul style="list-style-type: none"><li>✓ Clipboard</li><li>✓ Pencils</li><li>✓ Compass</li><li>✓ Topographic map of study sites</li><li>✓ Appropriate field clothing for students</li><li>✓ Field guide</li><li>✓ Field journal</li></ul>
<b>Vocabulary</b>	Scientific Method, Field Investigation, Observation, Question, Hypothesis, Procedure, Data, Compare/Contrast, Ecosystem
<b>Standards</b>	6-8 LS2A An ecosystem consists of all the populations living within a specific area and the nonliving factors they interact with. One geographical area may contain many ecosystems.  6-8 LS2B Energy flows through an ecosystem from producers (plants) to consumers to decomposers. These relationships can be shown for specific populations in a food web.  6-8 SYSA Any system may be thought of as containing subsystems and as being a subsystem of a larger system

	<p>6-8 SYSB The boundaries of a system can be drawn differently depending on the features of the system being investigated, the size of the system, and the purpose of the investigation.</p> <p>6-8 SYSF The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as "systems."</p> <p>6-8 INQA —Question— Scientific inquiry involves asking and answering questions and comparing the answer with what scientists already know about the world.</p> <p>6-8 INQB —Investigate— Different kinds of questions suggest different kinds of scientific investigations</p> <p>6-8 INQC —Investigate— Collecting, analyzing, and displaying data are essential aspects of all investigations.</p> <p>6-8 INQG —Communicate Clearly— Scientific reports should enable another investigator to repeat the study to check the results.</p> <p>6-8 INQI —Consider Ethics— Scientists and engineers have ethical codes governing animal experiments, research in natural <u>ecosystems</u>, and studies that involve human subjects.</p>
<b>Background</b>	<p>The land is a dynamic, living, ever-changing community of plants and animals dependent upon each other and the other resources of its ecosystem for survival. The land does not stand still! Plants and animals are born, grow, and die to enrich and change the soil.</p> <p>Organic material, thus added, affects the ability of the soil to absorb and hold water that is needed by plants and animals. As the structure of the soil is changed by decomposing plants and animals, new types of plants are able to grow. This, in turn, determines the kind and the number of animals that can live in an area.</p> <p>The relationship of man to the land has undergone many evident and complex changes. Man has used and converted natural resources of the land to benefit his life. He has done things that have been bad for the land and bad for himself. Fortunately, he has also done other things which have been good for the land and himself.</p> <p>Man has learned how to better understand his affects on natural resources by looking at it in a scientific way. By observing and questioning how the</p>

	<p>natural world works man has learned how his choices can be both positive and negative for the earth. By conducting field investigations we can learn more about the natural world and our place in it. By doing so we can better our chance for a happy life for today's generation and those generations to follow.</p> <p>By studying soil, water, plants, and wildlife and how these natural resources work both independently and interdependently, students can learn how ecosystems work as a whole. Field investigations prepare students for a career in field biology, geology, or natural resource management.</p> <p>Whenever you go outside the "normal" classroom (the one with four walls), there are some necessary rules to follow. The outdoor school has certain rules too. Because you will be exploring our natural resources, it is necessary that you follow these rules for your protection and the protection of nature...</p> <ul style="list-style-type: none"> <li>• Report to your instructor when entering or leaving the field study area.</li> <li>• Never wander off by yourself; always stay with another person.</li> <li>• Always carry and use tools properly to avoid injury and damage to tools.</li> <li>• Walk, don't run!</li> <li>• Avoid trampling, cutting, marking, or taking plants out of their natural habitat.</li> <li>• Never dig up plants unless asked to do so by your instructor.</li> <li>• Only collect plant or rock specimens if instructed by your instructor.</li> <li>• Avoid disturbing or killing small animals such as insects, frogs, and chipmunks.</li> <li>• When walking in the woods or on the trail, don't trip on roots or go off trail.</li> <li>• Don't let overhanging branches snap back and hit the person behind you.</li> <li>• Always check the weather forecast and wear the appropriate clothing for outdoors.</li> </ul> <p>Field investigations are great for engaging students with behavior and learning issues as it gets kids outside, gives them freedom to choose their own course of study, provides fresh air, new scenery and plenty of exercise. Students that participate in field investigations will have a new appreciation for learning and their natural surroundings. Students will also gain skills in; observing, questioning, following rules and procedures, collecting/organizing data, and presentation of findings.</p>
<b>Procedure</b>	<p><b>Preparation:</b></p> <ol style="list-style-type: none"> <li>1. Ask students where they think the classroom is-most will say indoors in the school. Explain to them that they are about to work in a different kind of classroom.</li> </ol>

2. Explain the merits and philosophy behind student-directed field investigations.
3. Prepare students with your expectations in the field and how to use all of their five senses so they will be able to make some good observations in the field that will lead to their eventual field investigation question.
4. Create student field journals to use in the field for observations, questions, etc.
5. Collect all permission slips and arrange bus for trip, or walking directions to study site.
6. Find parent volunteers to assist in the field studies.

**Procedure:**

**In the field**

1. Go over appropriate field behavior (refer to **Mountain Manners**, or **Enviro-Ethics**).
2. Pick a well established trail to hike with the class and have them write down any observations they make that could possibly lead to a testable question for their field investigation.
3. Demonstrate a field investigation of your choice for the students to demonstrate how to conduct one such as soil chemistry, or water quality.
4. Have students share some of their observations with the class and discuss if these observations are testable and if so, how will you test it when you come back out here?
5. Return to school with field journal notes.

Possible field investigation topics:

- Test the pH of different soil samples collected on your field study
- Collect soil samples taken from a wooded area and from an open area. Compare the color weight, looseness and texture.
- Measure the water flow in a fast flowing and slow flowing portion of a stream. Collect and record temperature, stream flow, pH, dissolved oxygen, condition of stream bank.
- Observe and record the differences between the shape and size of insect larvae found in riffles vs. pools.
- Compare light meter readings under different types of trees. Relate shade tolerant and shade intolerant plants.
- Make a study of the age and growth rate of trees in the area by using an increment borer.
- Visit several wildlife habitats to study differences in soil, plants, water resources and why animals and plants live there together.
- Record weather observations in different habitats to see if you

	<p>can find microclimates.</p> <ul style="list-style-type: none"> <li>Correlate tree leader growth and tree ring count with past records of rainfall and growing seasons to see if weather had any effect of tree growth.</li> </ul> <p><b>Back at school</b></p> <ol style="list-style-type: none"> <li>Help students select and refine their research question for their upcoming field investigation.</li> <li>Have students create a Materials list so you and the students can collect all the necessary equipment for the investigations.</li> <li>Have students create their procedure to test their hypothesis out in the field.</li> <li>Set up the field trip date and arrange transportation back to the site.</li> <li>Find parent volunteers to assist in the field studies.</li> </ol> <p><b>Return to field study site</b></p> <ol style="list-style-type: none"> <li>Have students perform their field investigations with the help of parent volunteers.</li> <li>Debrief with the class what their experience was like and ideas on what went well, what needs improvement and how to present their findings back at school.</li> </ol> <p><b>Back at school</b></p> <ol style="list-style-type: none"> <li>Have students organize their data and put all their information together in a presentation (poster board, power point, pod cast, movie, etc.)</li> </ol>
<b>Suggested Assessment</b>	<ul style="list-style-type: none"> <li>Field investigation presentations (poster board, power point, pod cast, movie, etc.)</li> </ul>
<b>Adaptations</b>	Students can work in small groups instead of individually on field investigations. Students can also be given a list of various environmental issues in a local ecosystem that can be investigated by students.
<b>Extensions</b>	<ul style="list-style-type: none"> <li>Visit study site again at different times of the year and repeat your investigations. Compare your results: how has the soil changed? The temperature? The wind? The plants and animals? What factors influenced each change?</li> </ul>
<b>References/ Resources</b>	Council for Environmental Education. (2008). Project Wild: K-12 Curriculum and Activity Guide. Houston, TX: Author.